No. 8000142

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred Int'l, Inc.
Plant Breeding Division
Dept. of Cereal Seed Breeding

WHEREAS, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT TY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT T. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

COMMON WHEAT

'PL145'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington *this* 14th *day of* January *in the year of our Lord one thousand nine hundred and* eighty-two.

Attest:

Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

Secretary of Agriculture

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: *See Reverse.*

FORM APPROVED
OMB NO. 40-R3822

No certificate for plant variety protection may be issued unless a completed application form has been received (5 U.S.C. 553).

1a. TEMPORARY DESIGNATION OF VARIETY	1b. VARIETY NAME	FOR OFFICIAL USE ONLY
W443	~~Pioneer Brand~~ PL145 (7/18/80)	PV NUMBER 8000142
2. KIND NAME: Wheat	3. GENUS AND SPECIES NAME: Triticum aestivum	FILING DATE 7/14/80; TIME 1:00 A.M. (P.M.)
4. FAMILY NAME (BOTANICAL): gramineae	5. DATE OF DETERMINATION: August 1, 1977	FEE RECEIVED $ 500.00 $ 250.00; DATE 7/14/80 10/21/81

6. NAME OF APPLICANT(S)	7. ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*	8. TELEPHONE AREA CODE AND NUMBER
Pioneer Hi-Bred Int'l., Inc. Plant Breeding Division Dept. of Cereal Seed Breeding	Rt. #2 Hutchinson, Kansas 67501	(316) 662-5439

9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: *(Corporation, partnership, association, etc.)*	10. IF INCORPORATED, GIVE STATE AND DATE OF INCORPORATION	11. DATE OF INCORPORATION
Corporation	Iowa May, 1926	May, 1926

12. NAME AND MAILING ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS:
Dr. Charles Hayward
Pioneer Hi-Bred International, Inc.
Rt. #2
Hutchinson, Kansas 67501

13. **CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:**

- [x] 13A. Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
- [x] 13B. Exhibit B, Novelty Statement.
- [x] 13C. Exhibit C, Objective Description of the Variety *(Request form from Plant Variety Protection Office.)*
- [x] 13D. Exhibit D, Additional Description of the Variety.

14a. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a). (If "Yes," answer 14B and 14C below.)* [ ] YES [x] NO

14b. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?	14c. IF "YES," TO 14B, HOW MANY GENERATIONS OF PRODUCTION BEYOND BREEDER SEED?
[ ] YES [ ] NO	[ ] FOUNDATION [ ] REGISTERED [ ] CERTIFIED

15a. DID THE APPLICANT(S) FILE FOR PROTECTION OF THIS VARIETY IN OTHER COUNTRIES? [ ] YES [x] NO *(If "Yes," give name of countries and dates.)*

15b. HAVE RIGHTS BEEN GRANTED THIS VARIETY IN OTHER COUNTRIES? [ ] YES [x] NO *(If "Yes," give name of countries and dates.)*

16. DOES THE APPLICANT(S) AGREE TO THE PUBLICATION OF HIS/HER (THEIR) NAME(S) AND ADDRESS IN THE OFFICIAL JOURNAL? [x] YES [ ] NO

17. The applicant(s) declare(s) that a viable sample of basic seed of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

July 2, 1980 (DATE) — Charles Hayward (SIGNATURE OF APPLICANT)

July 2, 1980 (DATE) — * Dale L. Porter (Jmf) (SIGNATURE OF APPLICANT)

1

FORM GR-470 (1-78) *Legal representative for Pioneer Hi-Bred International, Inc.

INSTRUCTIONS

GENERAL: Send an original copy of the application and exhibits, at least 2,500 viable seeds, and $500 fee ($250 filing fee and $250 examination fee) to U.S. Dept. of Agriculture, Agricultural Marketing Service, Livestock, Poultry, Grain and Seed Division, Plant Variety Protection Office, National Agricultural Library Building, Beltsville, Maryland 20705. (See section 180.175 of the Regulations and Rules of Practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

ITEM	
5	Give the date the applicant determined that he had a new variety based on (1) the definition in section 41(a) of the Act and (2) the date a decision was made to increase the seed.
13a	Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4) evidence of uniformity and stability.
13b	Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties: (1) identify these varieties and state all differences objectively; (2) attach statistical data for characters expressed numerically and demonstrate that these differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.
13c	Fill in the Exhibit C, Objective Description form, for all characteristics for which you have adequate data.
13d	Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe, such as, plant habit, plant color, disease resistance, etc.
14a	If "YES" is specified (seed of this variety be sold by variety name only as a class of certified seed) the applicant may <u>NOT</u> reverse his affirmative decision after the variety has either been sold and so labeled, his decision published, or the certificate has been issued. However, if the applicant specified "NO," he may change his choice. (See section 180.16 of the Regulations and Rules of Practice.)
15a	See section 42 of the Plant Variety Protection Act and section 180.7 of the Regulations and Rules of Practice.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
NATIONAL AGRICULTURAL LIBRARY BUILDING
BELTSVILLE, MARYLAND 20705

FEB 26 1982

TV-35063

Subject: Seed Sample of Protected Variety
Certificate No. 8000142
Kind and Variety - Wheat 'PL145'
Breeder - Pioneer Hi-Bred International, Inc.

To: National Seed Storage Laboratory
Fort Collins, CO 80521

Attached is the above-identified sample and an Objective Description of Variety form in accordance with our Memorandum of Understanding and as agreed upon during my visit with Dr. Louis Bass on June 12, 1972.

One copy of this duplicate form showing the result of your germination test on 100 seeds of pure seed of this sample should be returned to this Office. Return of the duplicate form will serve as acknowledgement of receipt of the sample.

Germination: 95 % Date: 4/82

Sincerely,

Bernard M. Leese
Commissioner
Plant Variety Protection Office

Attachment

In duplicate

Sam W Dam
6/22/82

163798

13A. Exhibit A. Origin and Breeding History of Pioneer Brand 'PL145' Wheat

'PL145', Triticum aestivum L., em Thell., a hard red winter wheat was developed by Pioneer Hi-Bred International, Inc. from the cross NB34/Scout. The cross was made at the Hutchinson, Kansas station in 1967. NB34, Pioneer designation, was a single head selected by Pioneer at the International Maize and Wheat Improvement Center (CIMMYT) from the cross (CIMMYT cross No. 23584) 'Pitic 62'/II53-526('Chris' sib)//'Sonora 64'/3/Sonora 64/'Klein Rendidor'.

The F_1 generation was grown in the greenhouse at Hutchinson in 1967. F_2 plants were selected (for plant height, straw strength and good agronomic type) and bulked from a 1968 spring planting in Colorado. The F_3 generation was grown in a space planting at Hutchinson in 1969. In the space planted F_3 nursery, 153 individual plants were selected for winterhardiness, height, maturity, straw strength, disease resistance and for plant and head type. PL145, a single F_3-derived plant selection, was assigned the Pioneer selection number W443 in 1971. It has been tested in yield trials and for milling and baking quality since 1971 with the exception of 1976.

PL145 has shown uniformity and stability for all traits as described in Schedule C (Form LPGS-470-6) -- "Objective Description of Variety."

Variants of PL145 that can be expected are: tall plants (< 1/25,000), white glumes and awns (< 1/25,000), and awnless (< 1/25,000).

13B. Exhibit B. Novelty Statement

'PL145' is an awned, semidwarf hard red winter wheat cultivar, most similar to the variety 'Newton' in pedigree and in many phenotypic and agronomic traits. However, PL145 is uniquely different from Newton in glume and awn color. The glumes and awns of PL145 are brown whereas the glumes and awns of Newton are white.

PL145 has averaged 100 cm in height, about 2 cm shorter than Newton. In Pioneer trials, PL145 is 1/2 to 1 day earlier in heading than Newton. Newton is slightly more winterhardy than PL145. In our tests, PL145 has shown more resistance to lodging and straw breakage than Newton.

Like Newton, PL145 is resistant to soil borne mosaic virus and leaf rust (Puccinia recondita Rob. ex Desm. f. sp. tritici) and stem rust (P. graminis Pers. f. sp. tritici Eriks) races currently common in Kansas.

FORM APPROVED: OMB NO. 40-R3822

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*TRITICUM SPP.*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
Pioneer Hi-Bred International, Inc.

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
Plant Breeding Division
Department of Cereal Seed Breeding
Rt. #2
Hutchinson, Kansas 67501

FOR OFFICIAL USE ONLY

PVPO NUMBER 800142

VARIETY NAME OR TEMPORARY DESIGNATION
PL145

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (*e.g.* [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:

[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

[2] 1 = SPRING 2 = WINTER 3 = OTHER *(Specify)* _____ [2] 1 = SOFT 2 = HARD 3 = OTHER *(Specify)* _____

[2] 1 = WHITE 2 = RED 3 = OTHER *(Specify)* _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

[2][2][2] FIRST FLOWERING [2][2][9] LAST FLOWERING

4. MATURITY *(50% Flowering)*:

[0][1] NO. OF DAYS *EARLIER* THAN ..... [2] 1 = ARTHUR 2 = SCOUT 3 = CHRIS

[ ][ ] NO. OF DAYS *LATER* THAN ..... [ ] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT *(From soil level to top of head)*:

[1][0][0] CM. HIGH

[ ][ ] CM. TALLER THAN ..... [ ]

[1][1] CM. SHORTER THAN ..... [2] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING *(See reverse)*:

[2] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:

[1] 1 = YELLOW 2 = PURPLE

8. STEM:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[2] Waxy bloom: 1 = ABSENT 2 = PRESENT

[2] Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT

[1] Internodes: 1 = HOLLOW 2 = SOLID

[0][4] NO. OF NODES *(Originating from node above ground)*

[2][6] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

[1] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER *(Specify)*: _____

[2] Flag leaf: 1 = NOT TWISTED 2 = TWISTED

[1] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT

[2] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT

[1][6] MM. LEAF WIDTH *(First leaf below flag leaf)*

[3][0] CM. LEAF LENGTH *(First leaf below flag leaf)*:

11. HEAD:

[1] Density: 1 = LAX 2 = DENSE

[4] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER *(Specify)* Fusiform

[4] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[5] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER *(Specify)*: _____

[0][8] CM. LENGTH [1][0] MM. WIDTH

12. GLUMES AT MATURITY:

[2] Length: 1 = SHORT *(CA. 7 mm.)* 2 = MEDIUM *(CA. 8 mm.)* 3 = LONG *(CA. 9 mm.)*

[2] Width: 1 = NARROW *(CA. 3 mm.)* 2 = MEDIUM *(CA. 3.5 mm.)* 3 = WIDE *(CA. 4 mm.)*

[1] 1 = Glabrous 2 = Pubescent

[2] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[3] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[1] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[2] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[3] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

[2] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[5/4] Phenol reaction *(See instructions)*: 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

10/6/81

[3] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER *(Specify)* _____

[0][7] MM. LENGTH [0][3] MM. WIDTH [2][8] GM. PER 1000 SEEDS

17. SEED CREASE:

[1] Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[1] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] STEM RUST *(Races)* _____ [0] LEAF RUST *(Races)* _____ [0] STRIPE RUST *(Races)* _____ [0] LOOSE SMUT

[0] POWDERY MILDEW [0] BUNT [2] OTHER *(Specify)* Soil Borne Mosaic

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY [1] APHID *(Bydv.)* [1] GREEN BUG [0] CEREAL LEAF BEETLE

[0] OTHER *(Specify)* _____ HESSIAN FLY RACES: [ ] GP [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F [ ] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Scout 66	Seed size	Newton
Leaf size	Newton	Seed shape	Sage
Leaf color	Triumph 64	Coleoptile elongation	TAM 101
Leaf carriage	Newton	Seedling pigmentation	Newton

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. *(See attachment.)*

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

13D. Exhibit D. Additional Description of the Variety

'PL145' is a common hard red winter wheat, Triticum aestivum L.

Flowering date of PL145 is 1 to 2 days earlier than the variety Scout and 1/2 to 1 day earlier than Newton. At Hutchinson, Kansas, when seeded about October 10, average first flowering is about 222 days after emergence. Last flowering averages about seven days later. It is recognized that environmental factors influence flowering of varieties differently.

PL145 has averaged 100 cm in height, about 2 cm shorter than Newton and 11 cm shorter than Scout.

The plant color of PL145 at booting stage is green but a lighter green than Newton.

Anther color of PL145 is yellow, similar to Scout and Newton.

Anthocyanin has been absent in the stem of PL145. A waxy bloom occurs on the stem. Internodes of PL145 are hollow. At maturity, stems are yellow and very strong. Normally four stem nodes are present above ground. Internode length between flag leaf and leaf below is about 26 cm.

Auricles of PL145 are glabrous and lacking in anthocyanin.

Flag leaves are generally erect at booting and tend to be twisted. Hairs have not been observed on the first leaf sheath. A moderate amount of waxy bloom occurs on the last leaf sheath. The first leaf below the flag leaf averages about 16 mm wide and 30 cm long when measured at Hutchinson, Kansas.

Spikes are generally mid-dense to lax, fusiform, awned, and brown at maturity. Awns are round and about six to eight cm in length. Spike width and length averages about 10 mm and 8 cm, respectively. However, spike width and length are variable with plant population and level of production.

The glumes of PL145 are mid-wide and mid-long, generally oblique shoulders but some elevated, and glabrous. Beaks are acuminate and range from 2 to 4 mm long.

When evaluated at Hutchinson, Kansas, coleoptile color is white and seedling anthocyanin is absent.

Kernels are red in color, elliptical in shape, with rounded cheeks and a shallow crease. The brush is not collared and medium in size. The embryo is medium in size. Kernels average 7 mm long and 3 mm wide and about 28 g per 1000. Phenol reaction is brown-black.

10/6/81

13D. Exhibit D. (cont.)

PL145 is resistant to soil borne mosaic virus. It is moderately resistant to leaf rust (Puccinia recondita Rob. ex Desm. f. sp. tritici) and stem rust (P. graminis Pers. f. sp. tritici Eriks) races currently common in Kansas. PL145 has not been tested for specific races of leaf and stem rust nor has it been tested for Hessian fly (Mayetiola destructor Say) and bunt Tilletia carries (DC.) Tul.). It is susceptible to powdery mildew (Erysiphe graminis f. sp. tritici E. Marchal) and Septoria spp.

PL145 has a good yield record when compared with currently grown hard red winter wheats (Table 1). In the presence of soil borne mosaic virus, PL145 has a pronounced yield advantage over susceptible varieties. Short plant height and superior straw strength give PL145 excellent resistance to lodging.

PL145 has very good quality characteristics, especially volume potential, when compared to the average of current standard varieties in the HRW area. It has been tested by the Pioneer Wheat Quality Laboratory for several years. Table 2 gives 1979 values for PL145, Newton, Centurk and all checks grown in plots at Hutchinson, Kansas. Each value is an average of five tests. The figures show that PL145 is roughly equivalent to the checks for flour yield, protein and mixing time, slightly poorer for mixing tolerance evaluated with the mixograph and better for loaf volume (slightly better than Newton and Centurk, much better than the average of all checks).

Table 2. Milling and baking evaluation of PL145

	% Flour Yield	% Flour Protein	Mixograph		Microbake (10-g) Loaf Volume-cc
			Mix Time	Tolerance(1)	
PL145	66.5	11.3	3.7	4.0	70.8
Newton	65.8	11.4	3.7	6.4	67.1
Centurk	65.9	11.5	3.8	6.8	67.8
All checks	66.4	11.4	3.3	4.7	65.6

(1) Mixograph mixing tolerance -- evaluated on a 9-point scale on which 9 = very good, 5 = fair, 1 = very poor